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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MAI, ANH D

ART UNIT PAPER NUMBER

2814

DATE MAILED: 09/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/779,379	Applicant(s) CHAO, IWEN	
	Examiner Anh D. Mai	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 16-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group II, claims 1-15 and 25-30 in the reply filed on August 26, 2005 is acknowledged. However, since Group II also comprises two distinct species, Applicant has further elected Group IIA, claims 1-15 in a telephone conversation with Mr. James J. Namiki, Reg. No. 51,148 on September 7, 2005.

Status of the Claims

2. Claims 13, 14, 16, 25 and 26 have been amended. Invention, claims 1-15 have been elected without traverse. Claims 1-30 are pending. Action on merits of elected claims 1-15 follow.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 recites the limitation "the apparatus of claim 1, wherein **the deep trench isolation** comprises of a selected one of a dielectric and an insulation material" " in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Claim 1 does not include a "deep trench isolation".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 4-10 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Voldman (U.S. Pub. No. 2002/0066929).

With respect to claim 1, Voldman teaches an apparatus as claimed including:
a semiconductor device (12) formed on a conductivity region (20), and
a low resistive path barrier (30/26) formed surrounding the conductivity region (20) to isolate the conductivity region (20) from a substrate (34) that supports the conductivity region (20) and the low resistive path barrier (30/26). (See Fig. 2).

With respect to claim 4, the conductive region (20) of Voldman is at least one of n-type and p-type conductivity regions.

With respect to claim 5, the semiconductor device (12) of Voldman is a selected one of CMOS, BiCMOS, NMOS and PMOS.

With respect to claim 6, the low resistive path barrier (30/26) of Voldman is coupled to a power supply ($V_{\text{collector}}$).

With respect to claim 7, the substrate (34) of Voldman is selected from one of p-type and n-type substrate.

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With respect to claim 8, the low resistive path barrier (30/26) of Voldman comprises of a plug (26) coupled to a buried layer (30).

With respect to claim 9, the plug (26) of Voldman is coupled to a power supply ($V_{\text{collector}}$).

With respect to claim 10, the low resistive path barrier (30) comprises a selected one of N+ and P+ doped material.

With respect to claim 13, the low resistive path barrier (30) of Voldman comprises a first capacitive decoupling junction located at an interface between the low resistive path barrier (30) and the conductivity region (20), and a second capacitive decoupling junction located at an interface between the low resistive path barrier (30) and the substrate (34).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2, 3 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Voldman '929 as applied to claim 1 above, and further in view of Ellul et al. (U.S. Patent No. 5,614,750).

With respect to claim 2, Voldman teaches an apparatus comprising a low resistive path barrier (30) formed surrounding the conductive region (20).

Thus, Voldman is shown to teach all the features of the claim with the exception of further utilizing deep trench isolation.

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However, Ellul teaches a deep trench isolation (68) formed surrounding the low resistive path barrier (55) on the opposite side of the conductive region (57). (See Fig. 6).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to further isolate the low resistive path barrier of Voldman utilizing deep trench isolation as taught by Ellul to laterally isolate the apparatus from the adjacent devices.

With respect to claim 3, the deep trench of Ellul is extended into the substrate (52).

With respect to claim 11, as best understood by the examiner, the deep trench isolation (68) of Ellul comprises of a selected one of a dielectric and an insulation material.

6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Voldman '929 as applied to claim 1 above, and further in view of Takeuchi et al. (U.S. Patent No. 5,939,755).

Voldman is shown to teach all the features of the claim with the exception of explicitly disclosing the substrate is biased to 0 volts. Note that, the claimed biased to 0 volts does not appear to be critical since the Applicant has admitted that the substrate may be biased to the highest or lowest voltage.

However, Takeuchi teaches the substrate (11) may be biased to 0 volts (grounded). (See Figs. 2, 7, 9).

Note that the specification contains no disclosure of either the *critical nature of the claimed biased to 0 volts* of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the

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Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to bias the substrate of Voldman to 0 volts (ground) as taught by Takeuchi to avoid latchup.

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Voldman '929 as applied to claim 8 above, and further in view of Hoshi et al. (U.S. Patent No. 5,635,742).

Voldman teaches the apparatus as described in claim 8 above including: the low resistive path barrier (30/26) comprises a plug (26) coupled to a buried layer (30), wherein both plug and barrier layer are heavily doped (N^+). Note that the claimed resistivity do not appear to be critical.

Thus, Voldman is shown to teach all the features of the claim with the exception of explicitly disclosing the dopant concentration, thus, the resistivity of the plug and barrier layer.

However, Hoshi teaches an apparatus having a low resistive path barrier (2/7) surrounding a conductivity region (4), wherein the low resistive path barrier (2/7) comprises a plug (7) coupled to a buried layer (2) having dopants concentration of 5×10^{17} to $1 \times 10^{20} \text{ cm}^{-3}$ and 5×10^{17} to $1 \times 10^{21} \text{ cm}^{-3}$, respectively. (See Fig. 2, col. 4, lines 9-32).

Note that the specification contains no disclosure of either the *critical nature of the claimed resistivity of the plug and the buried layer* of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

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Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form the plug and buried layer of Voldman to have the dopant concentrations as taught by Hoshi to isolate conductive region from the substrate.

Note that, the resistivity are determined by the dopant concentration. Since the dopant concentration of Hoshi encompasses the dopant concentration of the instant plug and buried layer, thus, encompasses the claimed (resistivity) range.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Voldman '929 and Ellul '750 as applied to claim 2 above, and further in view of Desko et al. (U.S. Pub. No. 2003/0211701).

In view of Ellul, the deep trench isolation extends into the substrate and below the low resistive barrier (55).

Thus, Voldman and Ellul are shown to teach all the features of the claim with the exception of explicitly disclosing the depth of the trench. Note that, the claimed depth of 5 μm does not appear to be critical.

However, Desko teaches deep trench isolation (310) is formed into substrate (220) to a depth of 5 μm to 8 μm . (See Fig. 3).

Note that the specification contains no disclosure of either the *critical nature of the claimed depth of 5 μm* of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

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Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form the deep trench isolation of Ellul into the substrate to the depth as taught by Desko to isolate the apparatus from the adjacent devices.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (571) 272-1710. The examiner can normally be reached on 8:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



ANH D. MAI
PRIMARY EXAMINER